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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/748,271 | 12/31/2003 | Do-young Kim | 249/430 | 6611 |

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LEE & STERBA, P.C.
SUITE 2000
1101 WILSON BOULEVARD
ARLINGTON, VA 22209

| EXAMINER | |
|---|---|
| NGUYEN, JOSEPH H | |
| **ART UNIT** | **PAPER NUMBER** |
| 2815 | |

DATE MAILED: 05/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/748,271 | KIM ET AL. | |
| | Examiner | Art Unit | |
| | Joseph Nguyen | 2815 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *17 March 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-19 and 67-73* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19 and 67-73* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2/23/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Drawings*

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "semiconductor chip" in claims 1, 5-6, 10, 13-15, 67, 69, 71 and 73 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### *Claim Objections*

Claims 4 and 72 are objected to because of the following informalities:

In claim 4, line 2, the term "device" should be corrected to read, "chip".

In claim 72, line 7, the term "protective cap" should be corrected to read, "capping layer" to be consistent with the claim language

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 6-8, 10-13, 15-17 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Eida et al. (US 2001/0050532).

Regarding claims 1, 6, 8, 10, 15 and 17, Eida et al. discloses in figure 7 a thin film device (an electronic device) comprising a flexible substrate 1 (para [0144]); a semiconductor chip TFT (para [0052]) formed on the flexible substrate; a protective cap 6 sealing the semiconductor chip; and an insulating region 3 formed on the protective cap.

It is noted that substrate 1 is formed of plastic (para [0144]), which is the same material being used by applicant to form a flexible substrate (para [0011] of the instant application). As such the substrate 1 is flexible.

Regarding claims 2-3 and 11-12, applicant teaches in para [0051] and [0051] the protective cap formed of an ultraviolet curing material (acrylic resin) has a tensile strength greater than about 30 GPa and hardness greater than about 200 Brinell. Eida et al. discloses in para [0155] the cap 6 (intermediate insulating layer) is formed of acrylic resin. As such, the cap 6 of Eida et al. inherently comprises the physical properties as claimed herein.

Regarding claims 4, 7, 13 and 16, Eida et al. discloses in figure 7 the protective cap 6 is formed on an upper surface of the semiconductor chip.

Regarding claim 19, Eida et al. discloses in figure 7 the lower electrode 2 is connected to the semiconductor chip (TFT) and the lower electrode 2 is part of the organic EL device (also considered organic light emitting diode since it comprises lower electrode and upper electrode that form a diode) as shown in figure 8. In other words, the organic light emitting diode is connected to the chip.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 9 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eida et al. in view of Jones et al. (US 6329226).

Regarding claims 9 and 18, Eida et al. discloses the substrate is formed of glass to a certain thickness (para [0144], not necessarily the thickness of less than about 100 μm as claimed. However, Jones et al. discloses in col. 2, lines 59-67 the thin film device comprises a substrate formed of a thin sheet glass to a thickness 50 μm, which is less than about 100 μm. In view of such teaching, it would have been obvious at the time of the present invention to modify Eida et al. by including the glass substrate having a thickness less than about 100 μm such that a lightweight thin film device can be formed in a cost effective way because the thickness of the substrate is thin.

Claims 5, 14 and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eida et al. in view of Asano et al. (US 6916681).

Regarding claims 5, 14 and 73, Eida et al. discloses in figure 7 the protective cap 6 is formed on an upper surface of the semiconductor chip but not between the semiconductor chip and the flexible substrate as claimed. However, Asano et al. discloses in figure 7 the protective cap 704 (col. 10, lines 1-2) being between the semiconductor chip 706 and the flexible substrate 701 (col. 9, lines 63-67). In view of such teaching, it would have been obvious at the time of the present invention to modify Eida et al. by including the protective cap between the semiconductor chip and the flexible substrate to further protect the chip from foreign materials.

Claims 1, 67 and 68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al. (US 2005/0205868) in view of Jones et al.

Regarding claim 1, Yamazaki et al. discloses in figures 3-4 (showing the manufacturing steps of Embodiment 1), particularly in figure 4D a thin film semiconductor device comprising a substrate 301 (figure 3A); a semiconductor chip nTFT formed on the substrate; a protective cap 330 (para [0142], lines 1-2) sealing the chip and an insulating region 331 (para [0142], line 6) formed on the cap. Yamazaki et al. does not disclose the substrate being flexible. However, Jones et al. discloses in col. 2, lines 59-67 the thin film device comprises a flexible substrate formed of a thin sheet glass to a thickness 50 μm. In view of such teaching, it would have been obvious at the time of the present invention to modify Yamazaki et al. by including a substrate being flexible such that a lightweight semiconductor device can be formed to be used in a mobile device.

Regarding claim 67, Yamazaki et al. discloses in figures 3-4 (showing the manufacturing step of Embodiment 1), particularly in figure 4D the semiconductor chip comprises an active semiconductor element formed on the flexible substrate, the active semiconductor element including a source, a drain and a channel (NTFT inherently constitutes all these elements); an insulating region 305 (para [0114], line 1) formed on the active semiconductor element; a gate electrode 306 (para [0114], lines 3-4) formed on the insulating region; a second insulating region 326 (para [0140], line 1) formed on the gate electrode; a source electrode 327 (para [0140], line 2) formed on the second insulating region and connected with the source; a drain electrode 329 (para [0140], line 2) formed on the second insulating region and connected with the drain, and wherein

the protective cap 330 is formed on the second insulating region and on the source and drain electrodes.

Regarding claim 68, Yamazaki et al. discloses in figure 26 the structure (CMOS) as shown in figures 3-4 being incorporated to form a display device, showing a third insulating region 4142 (para [0344], lie 3) formed on the protective cap; a first pixel electrode 4143 (para [0345], line 1) formed on the third insulating region; a pixel element (para [0346], line 3) formed on the first pixel electrode; and a second pixel electrode 4146 (para [0352], line 5) formed on the pixel element.

Claims 69 and 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al. and Jones et al. in view of Asano et al.

Regarding claim 69, similar to claim 1 above, Yamazaki et al. and Jones et al. disclose substantially all the structures set forth in the claimed invention except the protective cap being on a surface of the chip opposite the flexible substrate. However, Asano et al. discloses in figure 7 the protective cap 704 (col. 10, lines 1-2) is on a surface of the semiconductor chip 706 opposite the flexible substrate 701 (col. 9, lines 63-67). In view of such teaching, it would have been obvious at the time of the present invention to modify Yamazaki et al. and Jones et al. by having the protective cap being on a surface of the semiconductor chip opposite the flexible substrate to further protect the semiconductor chip from foreign materials.

Regarding claim 71, similar to claim 69, Yamazaki et al. substantially all the structure set forth in claim 71. Yamazaki et al. further discloses in figure 4D a second

region of the protective material 330 is formed on the second insulating region 326 and on the source and drain electrodes 327, 329, and on the portion of the region of the protective material extending laterally beyond the active semiconductor element. Yamazaki et al. does not disclose an active semiconductor element formed on a region of the protective material and a portion of the region of the protective material extending laterally beyond the active semiconductor elements. However, Asano et al. discloses in figure 6 an active semiconductor element 607, 608 formed on a region of the protective material 603 and a portion of the region of the protective material extending laterally beyond the active semiconductor elements. In view of such teaching, it would have been obvious at the time of the present invention to modify Yamazaki et al. and Jones et al. by having an active semiconductor element formed on a region of the protective material and a portion of the region of the protective material extending laterally beyond the active semiconductor elements to further protect the semiconductor chip from foreign objects.

Claim 70 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al. and Jones et al. and Asano et al. (US 6,916,681) in view of Ikeda et al.

Regarding claim 70, applicant teaches in para [0051] and [0052] the protective cap formed of an ultraviolet curing material (acrylic resin) has a tensile strength greater than about 30 GPa and hardness greater than about 200 Brinell. Yamazaki et al. discloses the protective cap 330 is formed of silicon nitride (para [0142], line 2). Yamazaki et al. does not disclose the protective cap is formed of acrylic resin. However,

Ikeda et al. discloses the protective cap 107 can be formed of silicon nitride or acrylic resin (para [0086], lines 1-5). In view of such teaching, it would have been obvious at the time of the present invention to modify Yamazaki et al. and Jones et al. and Asano et al. by having the protective cap formed of an ultraviolet curing resin because silicon nitride and acrylic resin were art equivalents recognized, and therefore, the protective cap formed of acrylic resin inherently has a tensile strength greater than about 30 GPa and a hardness greater than about 200 Brinell.

Claim 72 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eida et al. in view of Yamazaki et al. (US 2002/0057055).

Regarding claim 72, similar to claim 1, Eida et al. discloses in figure 7 a thin film transistor liquid crystal display comprising a driving unit (TFT device) on a flexible substrate 1, the driving unit including a capping layer 6 the forms an upper surface of the driving unit; a pixel unit 2 (lower electrode electrically connecting the EL to TFT); and an insulating layer 3 disposed between the driving unit and the capping layer wherein the pixel unit is connected to the driving unit by a conductive element 2 (para [0067]) that passes through the insulating layer 3 and the capping layer 6, and the capping layer 6 inherently has a tensile strength higher than about 30 GPa and a hardness higher than about 200 Brinell as explained in rejection of claim 1 above.

Eida et al. does not disclose the capping layer contacting the flexible substrate. However, Yamazaki et al. discloses in figure 6 the capping layer 602 (para [0090]) contacting the flexible substrate 601(para [0089]). It is noted that element 602 is formed

of insulating material and thus can function as "capping layer". In view of such teaching, it would have been obvious at the time of the present invention to modify Eida et al. by including the capping layer contacting the flexible substrate such that the thin film transistor can be further prevented from foreign materials.

### *Response to Arguments*

Applicant's arguments with respect to claims 1-19 and 67-73 have been considered but are moot in view of the new ground(s) of rejection.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Nguyen whose telephone number is (571) 272-1734. The examiner can normally be reached on Monday-Friday, 7:30 am- 4:30 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Parker can be reached on (571) 272-2298. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300 for regular communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JN
May 8, 2006.

SPE Kenneth Parker